

ABSTRACT

A novel process for preparing chromium dioxide of substantially high purity as well as composites of $\text{CrO}_2/\text{Cr}_2\text{O}_3$ and $\text{CrO}_2/\text{Cr}_2\text{O}_5$ following a sequence of simple steps. The process does not require pressure as a control parameter during the process of synthesis. No chemical modifier has been used to bring down the working pressure during synthesis. Fairly hard sintered pellets of CrO_2 can be obtained without introducing any detectable impurity phase that usually appears during the process of sintering. Further, $\text{CrO}_2/\text{Cr}_2\text{O}_3$ and $\text{CrO}_2/\text{Cr}_2\text{O}_5$ composites have also been prepared where the fraction of insulating Cr_2O_3 or Cr_2O_5 in metallic CrO_2 can be easily controlled. Significant negative magnetoresistance is found in pure CrO_2 (5% MR) as well as $\text{CrO}_2/\text{Cr}_2\text{O}_3$ (33% MR) composites near room temperature. The MR studies on the $\text{CrO}_2/\text{Cr}_2\text{O}_5$ composites have been done and significant negative MR (22%) has been found in $\text{CrO}_2/\text{Cr}_2\text{O}_5$ composites near room temperature.